

Claims

- [c1] 1. A method for making a flame-retarded polycarbonate resin comprising the step of adding to a high melt strength polycarbonate resin an effective flame-retardant amount of a combination of a potassium salt of a perfluoroalkane sulfonate and a sodium salt of toluene sulfonic acid.
- [c2] 2. The method of claim 1, wherein the high melt strength polycarbonate resin comprises an antidrip agent.
- [c3] 3. The method of claim 2, wherein the potassium salt of a perfluoroalkane sulfonate comprises a 1 to 4 carbon alkane group.
- [c4] 4. The method of claim 3, wherein the potassium salt of a perfluoroalkane sulfonate is potassium perfluorobutane sulfonate and the sodium salt of toluene sulfonic acid is sodium toluene sulfonic acid.
- [c5] 5. The method of claim 4, wherein the potassium perfluorobutane sulfonate is added to the polycarbonate resin in an amount of from 0.005 to 0.05 weight %.
- [c6] 6. The method of claim 3, wherein the potassium salt of a perfluoroalkane sulfonate is potassium trifluoromethane sulfonate and the sodium salt of toluene sulfonic acid is sodium toluene sulfonic acid.
- [c7] 7. The method of claim 6, wherein the potassium trifluoromethane sulfonate is added to the polycarbonate resin in an amount of from 0.005 to 0.05 weight %.
- [c8] 8. The method of claim 2, wherein the sodium salt of toluene sulfonic acid is sodium toluene sulfonic acid.
- [c9] 9. The method of claim 8, wherein the sodium toluene sulfonic acid is added in an amount of from 0.005 to 0.1 weight %.
- [c10] 10. The method of claim 9, wherein the potassium salt of a perfluoroalkane sulfonate comprises a 1 to 4 carbon alkane group.
- [c11] 11. The method of claim 10, wherein the potassium salt of a perfluoroalkane sulfonate is potassium perfluorobutane sulfonate.

- [c12] 12. The method of claim 11, wherein the potassium perfluorobutane sulfonate is added to the polycarbonate resin in an amount of from 0.005 to 0.05 weight %.
- [c13] 13. The method of claim 10, wherein the potassium salt of a perfluoroalkane sulfonate is potassium trifluoromethane sulfonate.
- [c14] 14. The method of claim 13, wherein the potassium trifluoromethane sulfonate is added to the polycarbonate resin in an amount of from 0.005 to 0.05 weight %.
- [c15] 15. The method of claim 2, wherein the potassium salt of a perfluoroalkane sulfonate and the sodium salt of toluene sulfonic acid are added together as a flame-retardant composition.
- [c16] 16. The method of claim 15, wherein the potassium salt of a perfluoroalkane sulfonate comprises a 1 to 4 carbon alkane group.
- [c17] 17. The method of claim 16, wherein the potassium salt of a perfluoroalkane sulfonate is potassium perfluorobutane sulfonate and the sodium salt of toluene sulfonic acid is sodium toluene sulfonic acid.
- [c18] 18. The method of claim 17, wherein the potassium perfluorobutane sulfonate is added to the polycarbonate resin in an amount of from 0.005 to 0.05 weight %.
- [c19] 19. The method of claim 16, wherein the potassium salt of a perfluoroalkane sulfonate is potassium trifluoromethane sulfonate and the sodium salt of toluene sulfonic acid is sodium toluene sulfonic acid.
- [c20] 20. The method of claim 19, wherein the potassium trifluoromethane sulfonate is added to the polycarbonate resin in an amount of from 0.005 to 0.05 weight %.
- [c21] 21. The method of claim 15, wherein the sodium salt of toluene sulfonic acid is sodium toluene sulfonic acid.
- [c22] 22. The method of claim 21, wherein the sodium toluene sulfonic acid is added

in an amount of from 0.005 to 0.1 weight %.

[c23] 23. The method of claim 22, wherein the potassium salt of a perfluoroalkane sulfonate comprises a 1 to 4 carbon alkane group.

[c24] 24. The method of claim 23, wherein the potassium salt of a perfluoroalkane sulfonate is potassium perfluorobutane sulfonate.

[c25] 25. The method of claim 24, wherein the potassium perfluorobutane sulfonate is added to the polycarbonate resin in an amount of from 0.005 to 0.05 weight %.

[c26] 26. The method of claim 23, wherein the potassium salt of a perfluoroalkane sulfonate is potassium trifluoromethane sulfonate.

[c27] 27. The method of claim 26, wherein the potassium trifluoromethane sulfonate is added to the polycarbonate resin in an amount of from 0.005 to 0.05 weight %.

[c28] 28. The method of claim 15, wherein the flame-retardant composition comprises the potassium salt of a perfluoroalkane sulfonate and the sodium salt of toluene sulfonic acid in an aqueous carrier.

[c29] 29. The method of claim 28, wherein the potassium salt of a perfluoroalkane sulfonate comprises a 1 to 4 carbon alkane group.

[c30] 30. The method of claim 27, wherein the potassium salt of a perfluoroalkane sulfonate is potassium perfluorobutane sulfonate and the sodium salt of toluene sulfonic acid is sodium toluene sulfonic acid.

[c31] 31. The method of claim 30, wherein the potassium perfluorobutane sulfonate is added to the polycarbonate resin in an amount of from 0.005 to 0.05 weight %.

[c32] 32. The method of claim 29, wherein the potassium salt of a perfluoroalkane sulfonate is potassium trifluoromethane sulfonate and the sodium salt of toluene sulfonic acid is sodium toluene sulfonic acid.

- [c33] 33. The method of claim 32, wherein the potassium trifluoromethane sulfonate is added to the polycarbonate resin in an amount of from 0.005 to 0.05 weight %.
- [c34] 34. The method of claim 28, wherein the sodium salt of toluene sulfonic acid is sodium toluene sulfonic acid.
- [c35] 35. The method of claim 34, wherein the sodium toluene sulfonic acid is added in an amount of from 0.005 to 0.1 weight %.
- [c36] 36. The method of claim 35, wherein the potassium salt of a perfluoroalkane sulfonate comprises a 1 to 4 carbon alkane group.
- [c37] 37. The method of claim 36, wherein the potassium salt of a perfluoroalkane sulfonate is potassium perfluorobutane sulfonate.
- [c38] 38. A composition comprising a high melt strength polycarbonate resin and an effective flame-retardant amount of a potassium salt of a perfluoroalkane sulfonate and a sodium salt of toluene sulfonic acid.
- [c39] 39. The composition of claim 38, wherein the potassium salt of a perfluoroalkane sulfonate comprises a 1 to 4 carbon alkane group.
- [c40] 40. The composition of claim 39, wherein the potassium salt of a perfluoroalkane sulfonate is potassium perfluorobutane sulfonate.
- [c41] 41. The composition of claim 40, wherein the potassium perfluorobutane sulfonate is added to the polycarbonate resin in an amount of from 0.005 to 0.05 weight %.
- [c42] 42. The composition of claim 39, wherein the potassium salt of a perfluoroalkane sulfonate is potassium trifluoromethane sulfonate.
- [c43] 43. The composition of claim 42, wherein the potassium trifluoromethane sulfonate is added to the polycarbonate resin in an amount of from 0.005 to 0.05 weight %.
- [c44] 44. The composition of claim 38, wherein the sodium salt of toluene sulfonic

acid is sodium toluene sulfonic acid.

[c45] 45. The composition of claim 44, wherein the sodium toluene sulfonic acid is added in an amount of from 0.005 to 0.05 weight %.

[c46] 46. The composition of claim 45, wherein the potassium salt of a perfluoroalkane sulfonate comprises a 1 to 4 carbon alkane group.

[c47] 47. The composition of claim 46, wherein the potassium salt of a perfluoroalkane sulfonate is potassium perfluorobutane sulfonate.

[c48] 48. The composition of claim 47, wherein the potassium perfluorobutane sulfonate is added to the polycarbonate resin in an amount of from 0.005 to 0.05 weight %.

[c49] 49. The composition of claim 48, wherein the potassium salt of a perfluoroalkane sulfonate is potassium trifluoromethane sulfonate.

[c50] 50. The composition of claim 49, wherein the potassium trifluoromethane sulfonate is added to the polycarbonate resin in an amount of from 0.005 to 0.05 weight %.

[c51] 51. The composition of claim 45, wherein the potassium salt of a perfluoroalkane sulfonate comprises a 1 to 4 carbon alkane group.

[c52] 52. The composition of claim 51, wherein the potassium salt of a perfluoroalkane sulfonate is potassium perfluorobutane sulfonate.

[c53] 53. The composition of claim 52, wherein the potassium perfluorobutane sulfonate is added to the polycarbonate resin in an amount of from 0.005 to 0.05 weight %.

[c54] 54. The composition of claim 51, wherein the potassium salt of a perfluoroalkane sulfonate is potassium trifluoromethane sulfonate.

[c55] 55. The composition of claim 54, wherein the potassium trifluoromethane sulfonate is added to the polycarbonate resin in an amount of from 0.005 to 0.05 weight %.

- [c56] 56. The composition of claim 38, further comprising an antidrip agent.
- [c57] 57. A fire-retardant additive comprising a potassium salt of a perfluoroalkane sulfonate and a sodium salt of toluene sulfonic acid in a ratio which provides synergistic effectiveness as a flame-retardant additive for high melt strength polycarbonate.
- [c58] 58. The additive of claim 57, wherein the potassium salt of a perfluoroalkane sulfonate and the sodium salt of toluene sulfonic acid are present in a ratio of from about 0.1 to 2.0 by weight.
- [c59] 59. The additive of claim 58, wherein the potassium salt of a perfluoroalkane sulfonate and the sodium salt of toluene sulfonic acid are present in a ratio of from about 0.18 to 1.8 by weight.
- [c60] 60. The additive of claim 57, wherein the potassium salt of a perfluoroalkane sulfonate has a 1 to 4 carbon alkane group.
- [c61] 61. The additive of claim 60, wherein the potassium salt of a perfluoroalkane sulfonate is potassium perfluorobutane sulfonate.
- [c62] 62. The additive of claim 60, wherein the potassium salt of a perfluoroalkane sulfonate is potassium trifluoromethane sulfonate.
- [c63] 63. The additive of claim 57, wherein the sodium salt of toluene sulfonic acid is sodium toluene sulfonic acid.
- [c64] 64. The additive of claim 63, wherein the potassium salt of a perfluoroalkane sulfonate has a 1 to 4 carbon alkane group.
- [c65] 65. The additive of claim 64, wherein the potassium salt of perfluoroalkane sulfonate is potassium perfluorobutane sulfonate.
- [c66] 66. The additive of claim 65, wherein the potassium salt of a perfluoroalkane sulfonate and the sodium salt of toluene sulfonic acid are present in a ratio of from about 0.1 to 2.0 by weight.
- [c67] 67. The additive of claim 65, wherein the potassium salt of a perfluoroalkane

sulfonate and the sodium salt of toluene sulfonic acid are present in a ratio of from about 0.18 to 1.8 by weight.

[c68] 68. The additive of claim 64, wherein the potassium salt of perfluoroalkane sulfonate is potassium trifluoromethane sulfonate.

[c69] 69. The additive of claim 68, wherein the potassium salt of a perfluoroalkane sulfonate and the sodium salt of toluene sulfonic acid are present in a ratio of from about 0.1 to 2.0 by weight.

[c70] 70. The additive of claim 68, wherein the potassium salt of a perfluoroalkane sulfonate and the sodium salt of toluene sulfonic acid are present in a ratio of from about 0.18 to 1.8 by weight.

[c71] 71. The additive of claim 57, wherein the additive comprises the potassium salt of a perfluoroalkane sulfonate and the sodium salt of toluene sulfonic acid in an aqueous carrier.

[c72] 72. The additive of claim 71, wherein the potassium salt of a perfluoroalkane sulfonate and the sodium salt of toluene sulfonic acid are present in a ratio of from about 0.1 to 2.0 by weight.

[c73] 73. The additive of claim 71, wherein the potassium salt of a perfluoroalkane sulfonate and the sodium salt of toluene sulfonic acid are present in a ratio of from about 0.18 to 1.8 by weight.

[c74] 74. The additive of claim 71, wherein the potassium salt of a perfluoroalkane sulfonate is potassium perfluorobutane sulfonate and the sodium salt of toluene sulfonic acid is sodium toluene sulfonic acid.

[c75] 75. The additive of claim 57, further comprising an antidrip agent.